

**PATENT COOPERATION TREATY**  
**PCT**  
**INTERNATIONAL PRELIMINARY EXAMINATION REPORT**  
(PCT Article 36 and Rule 70)

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REPORT PCT

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Applicant ASIAWORLD SHIPPING SERVICES PTY LTD et al		

<p>1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of 3 sheets, including this cover sheet.</p> <p><input checked="" type="checkbox"/> This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).</p> <p>These annexes consist of a total of 13 sheet(s).</p>	
<p>3. This report contains indications relating to the following items:</p> <p>I <input checked="" type="checkbox"/> Basis of the report</p> <p>II <input type="checkbox"/> Priority</p> <p>III <input type="checkbox"/> Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</p> <p>IV <input type="checkbox"/> Lack of unity of invention</p> <p>V <input checked="" type="checkbox"/> Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</p> <p>VI <input type="checkbox"/> Certain documents cited</p> <p>VII <input type="checkbox"/> Certain defects in the international application</p> <p>VIII <input type="checkbox"/> Certain observations on the international application</p>	

Date of submission of the demand 6 July 2005	Date of completion of the report 29 March 2006
Name and mailing address of the IPEA/AU AUSTRALIAN PATENT OFFICE PO BOX 200, WODEN ACT 2606, AUSTRALIA E-mail address: pct@ipaustalia.gov.au Facsimile No. (02) 6285 3929	Authorized Officer  B. NGUYEN Telephone No. (02) 6283 2306

**I. Basis of the report**

1. With regard to the **elements** of the international application:\*
- ☐ the international application as originally filed.
- ☒ the description, pages **1, 8 - 19** as originally filed,  
pages , filed with the demand,  
pages **2 - 7, 7a**, received on **17 March 2006** with the letter of **17 March 2006**
- ☒ the claims, pages , as originally filed,  
pages , as amended (together with any statement) under Article 19,  
pages , filed with the demand,  
pages **20 - 25**, received on **17 March 2006** with the letter of **17 March 2006**
- ☒ the drawings, pages **1/5 - 5/5**, as originally filed,  
pages , filed with the demand,  
pages , received on with the letter of
- ☐ the sequence listing part of the description:  
pages , as originally filed  
pages , filed with the demand  
pages , received on with the letter of
2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.  
These elements were available or furnished to this Authority in the following language which is:
- ☐ the language of a translation furnished for the purposes of international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of the translation furnished for the purposes of international preliminary examination (under Rules 55.2 and/or 55.3).
3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:
- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished
4. ☐ The amendments have resulted in the cancellation of:
- ☐ the description, pages
- ☐ the claims, Nos.
- ☐ the drawings, sheets/fig.
5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).\*\*

\* Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17).

\*\* Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report

**V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement****1. Statement**

Novelty (N)	Claims 1 – 31	YES
	Claims	NO
Inventive step (IS)	Claims 1 – 31	YES
	Claims	NO
Industrial applicability (IA)	Claims 1 – 31	YES
	Claims	NO

**2. Citations and explanations (Rule 70.7)****NOVELTY (N): Claims 1 – 31**

None of the documents cited in the International Search Report discloses all the features as defined in the independent claims 1, 4, 18, 21, 24 and 28.

These claims are novel in the sense of Article 33(2) PCT.

**INVENTIVE STEP (IS): Claims 1 – 31**

Claims 1, 4, 18, 21, 24 and 28:

The cited prior art, either taken alone or in combination does not give any indication that would lead a person skilled in the art to the claimed method of removing a residual gas from inside a conventional shipping container, or an enclosure after a period of time in which goods were located in the container or an enclosure, and also the claimed residual gas removal apparatus arranged to be operatively coupled to an enclosure for removing residual gas from inside the enclosure.

Therefore, the invention defined in these claims is not obvious to a person skilled in the art.

Accordingly, the invention defined in claims 1, 4, 18, 21, 24 and 28 is considered to involve an inventive step in the sense of Article 33(3) PCT.

Claims 2, 3, 5 – 17, 19, 20, 22, 23, 25 – 27, 29 – 31 satisfy the requirements of novelty and inventive step by virtue of their dependency.

Claims 1 – 31 are industrially applicable.

at fully eliminating trapped or desorbed gases, and highly dangerous from an occupational health standpoint, since the gases used for effective fumigation are extremely toxic.

5 In other situations, a container can be used to transport painted, enamelled or laquered items such as furniture or vehicles or other articles which can emit noxious smells or fumes over time which can become concentrated in the confined container space. Also if a chemical or a solvent being transported leaks during  
10 movement of the container this can create a residual gas in the container. If perishable goods are being transported and become mouldy or rotten, this can also result in the generation of noxious gases. In any of these situations the gases or vapours generated in the container can pose an  
15 environmental exposure risk and possibly overpower or poison persons who may access and enter the container upon its arrival and unpacking at its destination.

In the specification which follows, when the term "residual gas" is used it refers to any measurable quantity  
20 of gases, fumes or vapours remaining in, or generated in, an enclosed chamber, the chamber having been sealed for a period of time. When the term "conventional shipping container" is used it refers to the commonly used containers of varying lengths and heights (for example 40-  
25 foot length or 20-foot length containers), well known in the cargo shipping and rail transportation industries. These containers normally are made of metal with corrugated side walls and an outwardly openable double door located at one end of the container for access thereinto.

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#### Summary of the Invention

In a first aspect the present invention provides a method of removing a residual gas from inside a conventional shipping container after a period of time in  
35 which goods were located in the container, the method comprising the steps of:

- accessing the container via an end door opening of the container;
- extracting at least some of the residual gas present in the container via the end door opening;
- 5 and
- providing a flow of a flushing gas into the container via the end door opening to flush residual gas from the container.

Such a method allows trapped residual gases inside the  
10 container to be safely extracted with minimal risk to persons who may need to access the container during its later unpacking.

Preferably the step of extracting the residual gas reduces gas pressure in the container below ambient  
15 atmospheric pressure outside the container.

Preferably when the pressure of gas in the container reaches a pre-determined value, the flow of flushing gas is initiated and the gas pressure in the container increases.

In a second aspect the present invention provides a  
20 method of removing a residual gas from inside a conventional shipping container after a period of time in which goods were located in the container, the method comprising the steps of:

- accessing the container via an end door opening of  
25 the container; and
- delivering a flow of a flushing gas into the container via the end door opening to flush the residual gas from the container, with a flow of the flushing gas and the residual gas being removed from the container via the  
30 end door opening.

Preferably the flow and/or total pressure of gases within the container is monitored and controlled.

Preferably a majority of the residual gas present in the container is extracted.

35 Preferably the method further comprises the step of absorbing/adsorbing at least part of the residual gas

extracted from the container into/onto an absorption/adsorption means. Most preferably substantially all of the extracted residual gas is absorbed/adsorbed into/onto the absorption/adsorption means.

5 Preferably the method further comprises the step of one of washing the absorption/adsorption means, decomposing the residual gas on the absorption/adsorption means and discarding the absorption/adsorption means.

10 Preferably the step of accessing the container involves:

- opening an end door of the container; and
- operatively coupling a panel to the container at the end door opening, and operatively coupling a gas inlet means and a gas extraction means to the panel so that the container is sealed during the removal of the flushing gas and the residual gas from the container.

15 Preferably the flushing gas is introduced via the gas inlet means.

20 Preferably gas is extracted via the gas extraction means.

Preferably the gas extraction means is operatively coupled at a lower region of the panel relative to the location of the gas inlet means.

25 In one embodiment the panel itself can comprise a plurality of panels.

Preferably the flushing gas is atmospheric air.

30 Preferably the container is provided with means for monitoring and controlling the pressure of gas in the container.

Preferably the method further comprises the step of monitoring the concentration of residual gas in the container.

35 In a third aspect the present invention provides a method of removing a residual gas that is present in an enclosure after a period of time in which goods were

located in the container, the method comprising the steps of:

- accessing the enclosure via an opening to the enclosure;
- 5       - operatively coupling a panel, a gas inlet means and a gas extraction means to the opening, whereby the panel sealingly attaches at the opening and the gas inlet means and the gas extraction means are operatively coupled to the panel;
- 10       - extracting a flow of the residual gas via the gas extraction means until at least some of the residual gas present is removed; and
- providing a flow of a flushing gas into the enclosure via the gas inlet means to flush the
- 15       residual gas from the enclosure.

Preferably the step of extracting the residual gas reduces gas pressure in the enclosure below ambient atmospheric pressure outside the enclosure.

Preferably when the pressure of residual gas in the enclosure reaches a pre-determined value, the flow of flushing gas is initiated and the gas pressure in the enclosure increases.

In a fourth aspect the present invention provides a method of removing a residual gas that is present in an enclosure after a period of time in which goods were located in the container, the method comprising the steps of:

- accessing the enclosure via an opening to the enclosure;
- 30       - operatively coupling a panel having a gas inlet and a gas outlet to the opening, whereby the panel sealingly attaches at the opening;
- delivering a flow of a flushing gas into the enclosure via the gas inlet to flush the residual
- 35       gas from the enclosure, with a flow of the flushing

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gas and residual gas being removed from the enclosure via the gas outlet.

Preferably in either the third or fourth aspects the enclosure is defined by a conventional shipping container.

5 Preferably the method of the third or fourth aspects is otherwise as defined in the first or second aspects.

In a fifth aspect the present invention provides residual gas removal apparatus arranged to be operatively coupled to an enclosure for removing residual gas from  
10 inside the enclosure, the apparatus comprising:

- a panel arranged for operative coupling to the enclosure in a sealing manner;
- gas inlet means for operative coupling to the panel for introducing a flushing gas into the enclosure;
- 15 - gas extraction means for operative coupling to the panel for extracting gas from the enclosure;
- pressure monitoring means for monitoring the total pressure of gases within the enclosure; and
- controlling means for controlling the flow of gases  
20 through at least one of the gas inlet and gas extraction means in response to the monitored pressure within the enclosure.

Such pressure controlling means can permit the pressure in the enclosure to be elevated or reduced below  
25 ambient atmospheric pressure levels. In either condition, trapped gas located between goods or packing in the enclosure can be forced out of small pockets and more easily and efficiently extracted from the enclosure with minimal risk to persons who may need to access the  
30 container during its later unpacking.

Preferably the apparatus further comprises absorption/adsorption means for absorbing/adsorbing residual gas extracted from the container.

Preferably the absorption/adsorption means comprises  
35 an absorption/adsorption bed including activated carbon to



which at least part of the extracted residual gas attaches at its surface and in its pores.

Preferably the residual gas removal apparatus also comprises a panel arranged in use to be coupled to the enclosure in a sealing manner, the gas inlet means and the gas extraction means operatively coupled or mounted to the panel.

In a sixth aspect the present invention provides apparatus arranged to be operatively coupled to an enclosure for removing residual gas from inside the enclosure, the apparatus comprising:

- a framework mountable onto a surface and locatable adjacent to the enclosure in use; and
- a member mounted to the framework and comprising gas inlet means for introducing a flushing gas into the enclosure, gas extraction means for extracting gas from the enclosure and coupling means for coupling the member to the enclosure;

wherein the member is moveable between an in use coupled position in which the coupling means couples the member to the enclosure and a de-coupled position in which the member is spaced from the enclosure.

The ready coupling and decoupling of the residual gas removal apparatus achieved by moving the member in relation to the enclosure can facilitate its operation in a rapid manner, consequently minimising the risk of exposure to persons who operate the apparatus as well as those persons who need to access the enclosure during its later unpacking.

Preferably the member is pivotally mounted to the framework.

Preferably the member further comprises a panel for coupling to an opening in the enclosure.

Preferably the apparatus of the sixth aspect is otherwise as defined in the fifth aspect.

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### Brief Description of the Drawings

Notwithstanding any other forms which may fall within its scope, preferred forms of the invention will now be described, by way of example only, with reference to the accompanying drawings in which:

Figure 1 shows a right side perspective view of a shipping container fitted externally with a residual gas removal apparatus in accordance with one embodiment of the invention;

Figure 2 shows a left side perspective view of the embodiment of Figure 1;

Figure 3 shows an end perspective view of the embodiment of Figure 1 in which the residual gas removal apparatus is de-coupled from the shipping container;

Figure 4 shows an end view of a shipping container fitted externally with a residual gas removal apparatus in accordance with another embodiment of the invention;

Figure 5 is a side view of the residual gas removal apparatus of Figure 4;

Figure 6 is a plan view of the residual gas removal apparatus of Figure 4; and

Figure 7 is a plan view of the residual gas removal apparatus of Figure 4 when the apparatus is decoupled from the shipping container.

### Detailed Description of the Preferred Embodiments

As shown in the Figures, various embodiments of a residual gas removal apparatus 10 are shown that are

The claims defining the invention are as follows:

1. A method of removing a residual gas from inside a conventional shipping container after a period of time in which goods were located in the container, the method comprising the steps of:
- accessing the container via an end door opening of the container;
  - extracting at least some of the residual gas present in the container via the end door opening; and
  - providing a flow of a flushing gas into the container via the end door opening to flush residual gas from the container.
2. A method as claimed in claim 1 wherein the step of extracting the residual gas reduces gas pressure in the container below ambient atmospheric pressure outside the container.
3. A method as claimed in claim 2 wherein when the pressure of gas in the container reaches a pre-determined value, the flow of flushing gas is initiated and the gas pressure in the container increases.
4. A method of removing a residual gas from inside a conventional shipping container after a period of time in which goods were located in the container, the method comprising the steps of:
- accessing the container via an end door opening of the container; and
  - delivering a flow of a flushing gas into the container via the end door opening to flush the residual gas from the container, with a flow of the flushing gas and the residual gas being removed from the container via the end door opening.

5. A method as claimed in any one of the preceding claims wherein the flow and/or total pressure of gases within the container is monitored and controlled.
- 5 6. A method as claimed in any one of the preceding claims wherein a majority of the residual gas present in the container is extracted.
- 10 7. A method as claimed in any one of the preceding claims further comprising the step of absorbing/adsorbing at least part of the residual gas extracted from the container into/onto an absorption/adsorption means.
- 15 8. A method as claimed in claim 7 wherein substantially all of the extracted residual gas is absorbed/adsorbed into/onto the absorption/adsorption means.
- 20 9. A method as claimed in claim 7 or claim 8 further comprising the step of one of washing the absorption/adsorption means, decomposing the residual gas on the absorption/adsorption means and discarding the absorption/adsorption means.
- 25 10. A method as claimed in any one of the preceding claims wherein the step of accessing the container involves:
- opening an end door of the container; and
  - operatively coupling a panel to the container at the end door opening, and operatively coupling a
- 30 gas inlet means and a gas extraction means to the panel so that the container is sealed during the removal of the flushing gas and the residual gas from the container.
- 35 11. A method as claimed in claim 10 wherein the flushing gas is introduced via the gas inlet means.

12. A method as claimed in claim 10 or claim 11 wherein gas is extracted via the gas extraction means.
- 5 13. A method as claimed in any one of claims 10 to 12 wherein the gas extraction means is operatively coupled at a lower region of the panel relative to the location of the gas inlet means.
- 10 14. A method as claimed in any one of claims 10 to 13 wherein the panel itself comprises a plurality of panels.
- 15 15. A method as claimed in any one of the preceding claims wherein the flushing gas is atmospheric air.
16. A method as claimed in any one of the preceding claims wherein the container is provided with means for monitoring and controlling the pressure of gas in the container.
- 20 17. A method as claimed in any one of the preceding claims further comprising the step of monitoring the concentration of residual gas in the container.
- 25 18. A method of removing a residual gas that is present in an enclosure after a period of time in which goods were located in the enclosure, the method comprising the steps of:
- accessing the enclosure via an opening to the enclosure;
  - 30 - operatively coupling a panel, a gas inlet means and a gas extraction means to the opening, whereby the panel sealingly attaches at the opening and the gas inlet means and the gas extraction means are operatively coupled to the panel;
  - 35 - extracting a flow of the residual gas via the gas extraction means until at least some of the

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residual gas present is removed; and

- providing a flow of a flushing gas into the enclosure via the gas inlet means to flush the residual gas from the enclosure.

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19. A method as claimed in claim 18 wherein the step of extracting the residual gas reduces gas pressure in the enclosure below ambient atmospheric pressure outside the enclosure.

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20. A method as claimed in claim 19 wherein when the pressure of residual gas in the enclosure reaches a pre-determined value, the flow of flushing gas is initiated and the gas pressure in the enclosure increases.

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21. A method of removing a residual gas that is present in an enclosure after a period of time in which goods were located in the enclosure, the method comprising the steps of:

- 20 - accessing the enclosure via an opening to the enclosure;
- operatively coupling a panel having a gas inlet and a gas outlet to the opening, whereby the panel sealingly attaches at the opening;
- 25 - delivering a flow of a flushing gas into the enclosure via the gas inlet to flush the residual gas from the enclosure, with a flow of the flushing gas and residual gas being removed from the enclosure via the gas outlet.

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22. A method as claimed in any one of claims 18 to 21 wherein the enclosure is defined by a conventional shipping container.

35 23. A method as claimed in any one of claims 18 to 22

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wherein the method is otherwise as defined in any one of claims 5 to 17.

- 5 24. Residual gas removal apparatus arranged to be operatively coupled to an enclosure for removing residual gas from inside the enclosure, the apparatus comprising:
- a panel arranged for operative coupling to the enclosure in a sealing manner;
  - 10 - gas inlet means for operative coupling to the panel for introducing a flushing gas into the enclosure;
  - gas extraction means for operative coupling to the panel for extracting gas from the enclosure;
  - pressure monitoring means for monitoring the total pressure of gases within the enclosure; and
  - 15 - controlling means for controlling the flow of gases through at least one of the gas inlet and gas extraction means in response to the monitored pressure within the enclosure.

- 20 25. Apparatus as claimed in claim 24 further comprising absorption/adsorption means for absorbing/adsorbing residual gas extracted from the container.

- 25 26. Apparatus as claimed in claim 25 wherein the absorption/adsorption means comprises an absorption/adsorption bed including activated carbon to which at least part of the extracted residual gas attaches at its surface and in its pores.

- 30 27. Apparatus as claimed in any one of claim 24 to claim 26 wherein the residual gas removal apparatus also comprises a panel arranged in use to be coupled to the enclosure in a sealing manner, the gas inlet means and the gas extraction means operatively coupled or mounted to the panel.

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28. Apparatus arranged to be operatively coupled to an enclosure for removing residual gas from inside the enclosure, the apparatus comprising:

- 5       - a framework mountable onto a surface and locatable adjacent to the enclosure in use; and
- 10       - a member mounted to the framework and comprising gas inlet means for introducing a flushing gas into the enclosure, gas extraction means for extracting gas from the enclosure and coupling means for

15       coupling the member to the enclosure;  
wherein the member is moveable between an in use coupled position in which the coupling means couples the member to the enclosure and a de-coupled position in which the member is spaced from the enclosure.

15       29. Apparatus as claimed in claim 28 wherein the member is pivotally mounted to the framework.

20       30. Apparatus as claimed in claim 28 or claim 29 wherein the member further comprises a panel for coupling to an opening in the enclosure.

25       31. Apparatus as claimed in any one of claims 28 to 30 which is otherwise as defined in any one of claims 24 to 27.